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ABSTRACT

Following an introduction of the systems approach for handling information, a proposal is made for an educational data system for the South Carolina school system. Input data provided by schools, school districts, and professional personnel are to be processed for use primarily by various units of the State Education Department. This department has the responsibility of coordinating the systems in the State to develop procedures for transferring data essential to each district's operations. The data will be used to facilitate educational program planning, test scoring, evaluation, research, scheduling, simulations, and computer-assisted instruction. Appended are a statement of the philosophy of the State Board of Education, a review of the South Carolina Department of Education by the U.S. Office of Education, a Management Information System report by the State Department of Education, and an analysis of computer needs by I. B. M. Corporation. (DE)

ED034296

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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PLANNING DESIGN

FOR

B A S I C E D U C A T I O N A L D A T A S Y S T E M

1969

State Department of Education
Cyril B. Busbee, State Superintendent
Columbia, South Carolina

EM 002 607

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I. THE SYSTEMS CONCEPT

(Source: Study Committee of Council of Chief State School Officers, Phoenix, Arizona, 1967)

An information system is an organized arrangement for making the right information available to those who need it, when they need it, in the desired format, all at the least possible cost. The key to a systems approach in dealing with information is organization: the procedures for collecting, processing, and disseminating information must be coordinated and routinized.

Coordination will eliminate, at point of origin, data collection that is unnecessary, undesirable, infeasible, and redundant.

The systems approach to information handling demands some degree of routinization. A substantial portion of the information in a Statewide system necessarily will be routine in the sense that it will be collected and processed periodically. However, the information--or at least some of it--will be changed from time to time to keep pace with changing needs.

A characteristic of an information system is that it exists independently of the data that may be treated by it at any given moment in time. When effective data handling procedures are established, they can easily be adapted to new data.

Implementation of a Statewide educational information system will require the establishment of an information network leading from the data source to the highest organizational level and back again. This information network should be so designed that information may flow freely in any volume, form, sequence, or combination required for each user of the system. This implies that data will be either originally recorded in machine usable form or converted to such form as near the data source as possible, with provisions for editing (correcting) at a point near the data source and at various other points throughout the network. It is of critical importance that this information network be founded on the proposition that with movement upward through the organizational levels, less and less detailed information is required.

There will necessarily be occasions when upper levels in the information network need detailed reports about some specific activities at the lower levels. The information system must accommodate this need. It is most important, however, that such details be transmitted upward only when there is a valid reason for doing so. To do otherwise would impair the overall effectiveness of the information system.

Operational Principles

The ideal educational information system is founded upon clearly defined information specifications of educational function. Items of data, relative to these specifications, are organized around the logical poles of student, staff, instructional program, facility, financial,

and community information. In the ideal, comprehensive catalogs in these six areas would be available for use in the development and implementation of an operational system. Operational principles underlying the development of an information system are:

1) Master File Storage and Maintenance.--Storage of master files of information are maintained as near the source as practical, and where they are the most useful, as a part of the day-to-day operations, and where updating is a result of performing these operations.

2) Procedures for Data Transmission.--The system must provide for the transmission of data to those who need the information in carrying out education related responsibilities.

3) Diminishing Detail.--With movement upward through administrative levels, less detailed information is required--the school district requires a smaller number of detailed items of information than does the school; the State education agency requires a smaller number than the school district; etc.

4) Economy of Data Collection.--The system must yield a maximum of unduplicated information in each contact with a data source.

5) Compatibility.--Items of data in an education information system must be compatible to facilitate comparisons. This is accomplished by uniformity of terminology, de-

finitions, concepts, and procedures.

6) Data Item Selection.--An item to be included in an educational information system must meet one or more of the following criteria:

   a) Provide a basis for decision-making related to the management and direction of the education enterprise.

   b) Assist in the performance of regulatory, legislative, and congressional functions.

   c) Aid in the evaluation of the effectiveness of educational programs.

   d) Be useful in the teaching-learning process.

   e) Help inform the public about education.

7) Commitment.--Development and maintenance of an educational information system is dependent upon a commitment at top administrative levels to the optimum use of machines and human effort.

8) Confidentiality.--The privacy and rights of individuals; i.e., pupils, staff, school board members, etc., must be protected.

Any informational system is limited by the objectives of the organization and the resources allocated for the system. It is established or modified to accomplish certain ends by direct or derived application of data.

II. PROPOSED EDUCATIONAL DATA SYSTEM
(Based on New York State Department of Education Basic Educational Data System)

The Need

The demands for educational information are ever increasing. The public wants to know what is going on in our schools; the legislator and the administrator must make accurate and judicious decisions based on the past and the projected future; the researcher must have valid and reliable data in order to assess and update our educational programs. Present data are too often unrelated, unreliable, and untimely due to duplication of effort, late reporting, and slow data processing.

Handling educational data has become a massive problem. The Education Department presently utilizes many forms to solicit information of all kinds from elementary and secondary schools. Analysis and interpretation of these data, both in the Department and in the schools, require their manipulation in many complex and time-consuming ways either by hand or by involved machine processes. In the latter instance, keypunching and the availability of machine time are critical factors.

The System

In an effort to deal with these problems, the Department is developing a Basic Educational Data System by which key items of information on school enrollment and curriculum will be tied to unit record data for professional personnel and collected in machine sensible form.. In addition, through two subsystems, detailed financial and facilities data will be collected.

Information Network

The Basic Educational Data System is based on the establishment of an information network leading from the working records maintained at the smallest operating unit to the largest organizational level and back again.

The System assumes that, with movement upward through the network, less detailed information is required--the school requires a greater number of detailed items of information for its daily operation than does the school district; the school district requires a greater number than the State Education Department; the State Education Department requires a greater number than the U. S. Office of Education.

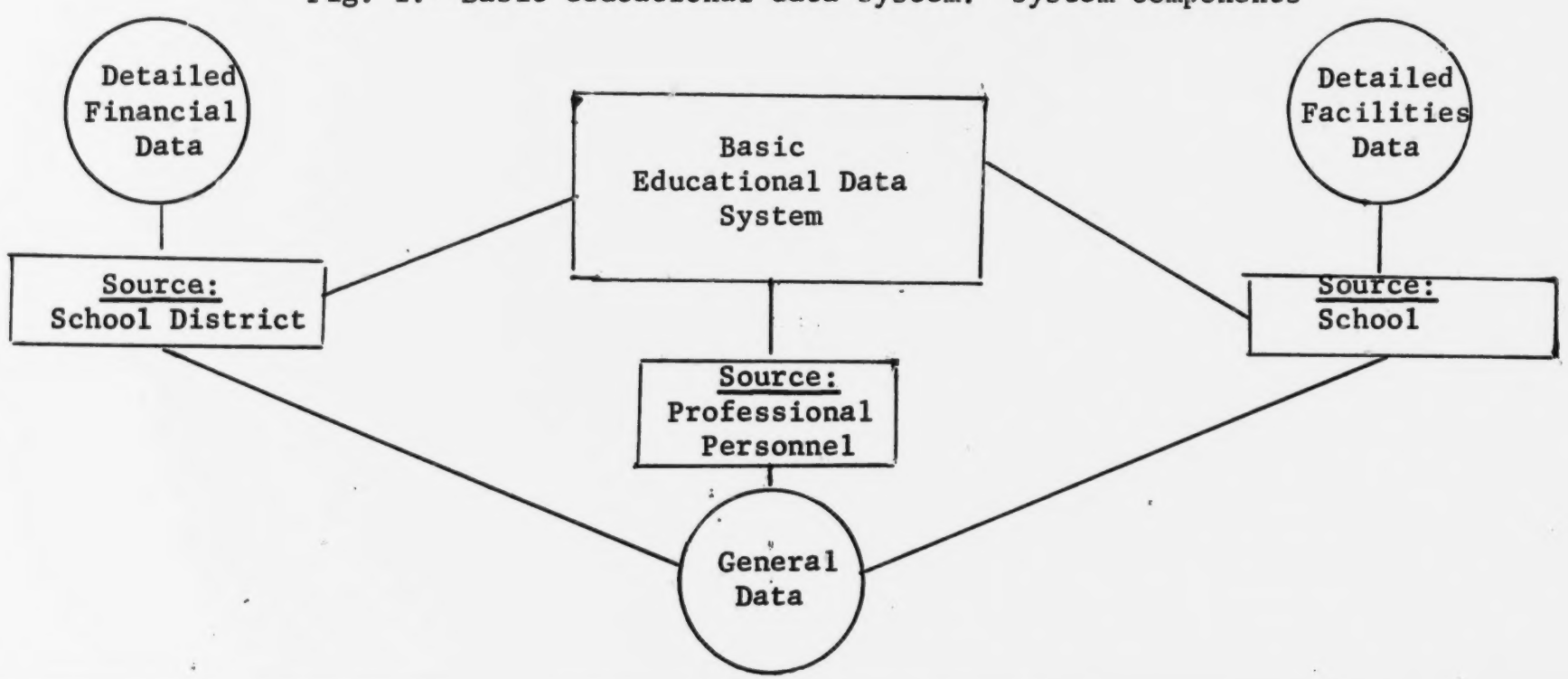
System Components

All data in the Basic Educational Data System will be collected through three sources--school district, schools, and professional personnel. The first phase of the System to be

placed in operation will be the general data segment pictured at the bottom of the chart (Figure 1). All three sources will contribute information to this segment. These data will be collected in a "one-shot" effort on a given day in the fall of each year. The information will be supplied in machine sensible form for immediate processing.

The detailed financial and facilities data segments, pictured at the top of the chart, are being separately designed and implemented due to the large quantity of data required in these areas. The source for financial data is the school district; individual schools will supply facilities data.

Fig. 1.--Basic educational data system: system components



Detail of General Data Segment

This chart (Figure 2) provides a more detailed view of the "General Data" segment of the System pictured at the bottom of the preceding chart. The items listed under each of the sources represent types of data that will be collected. Final determination of "basic" items is being made in consultation with representatives of the various units of the Department, the field, and other interested organizations.

Fig. 2.--Basic education data system: detail of general data segment

Source: School District	Source: Professional Personnel	Source: School

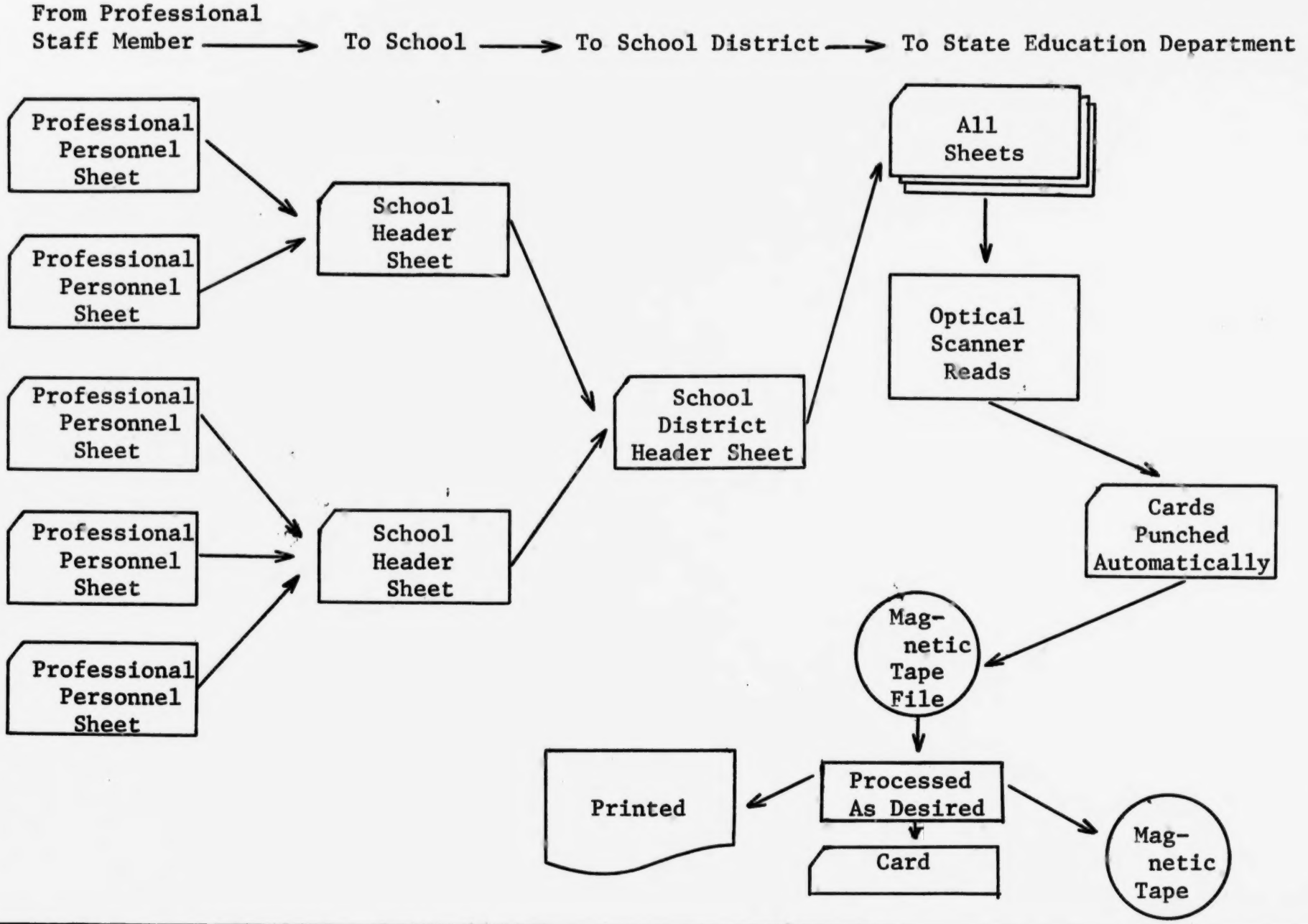
School District Code
Census Data
Non-Professional Staff Data
  Number
  Type
Transportation Data
	Personal Data
	  Social Security Number
	  Name
	  Date of Birth
	  Degree Status
	  Certification Status
	  Nature of Appointment
	  Experience
	  Prior Occupations
	  Salary
	Course Assignment Data
	  Class Schedule
	  Registration by Class
	  Type of Students
	  Above Average
	  Average
	  Below Average
	  Mixed
	Non-Instructional and Special Field Personnel Data
		School Code
		Grade Group
		Enrollment by Grade
		Ethnic Distribution
		Length of Class Periods
		Number of Class Periods
		Start-End Times of School Day
		Number of Graduates Preceding Year
		If Secondary School, Occupation of Graduates
		Limited Facilities Data
		  Number and Type of Instructional Rooms
		  Special Equipment
		Extracurricular Activities
		Periodic Detailed Data for Each Curriculum and Special Service Area

Input Flow

The basic source documents of the Basic Educational Data System will be mark-sense sheets. Four types will be necessary for the general data segment--one for each professional staff member (instructional), one for each professional staff member (non-instructional), one for each school, and one for each school district in the State.

In each school, mark-sense sheets for individual staff members will be combined with a school-header sheet and forwarded to the school district office. The sets for the various schools in a district will be combined with a school district header sheet and forwarded to the State Education Department for processing.

Fig. 3.--Basic educational data system: input flow

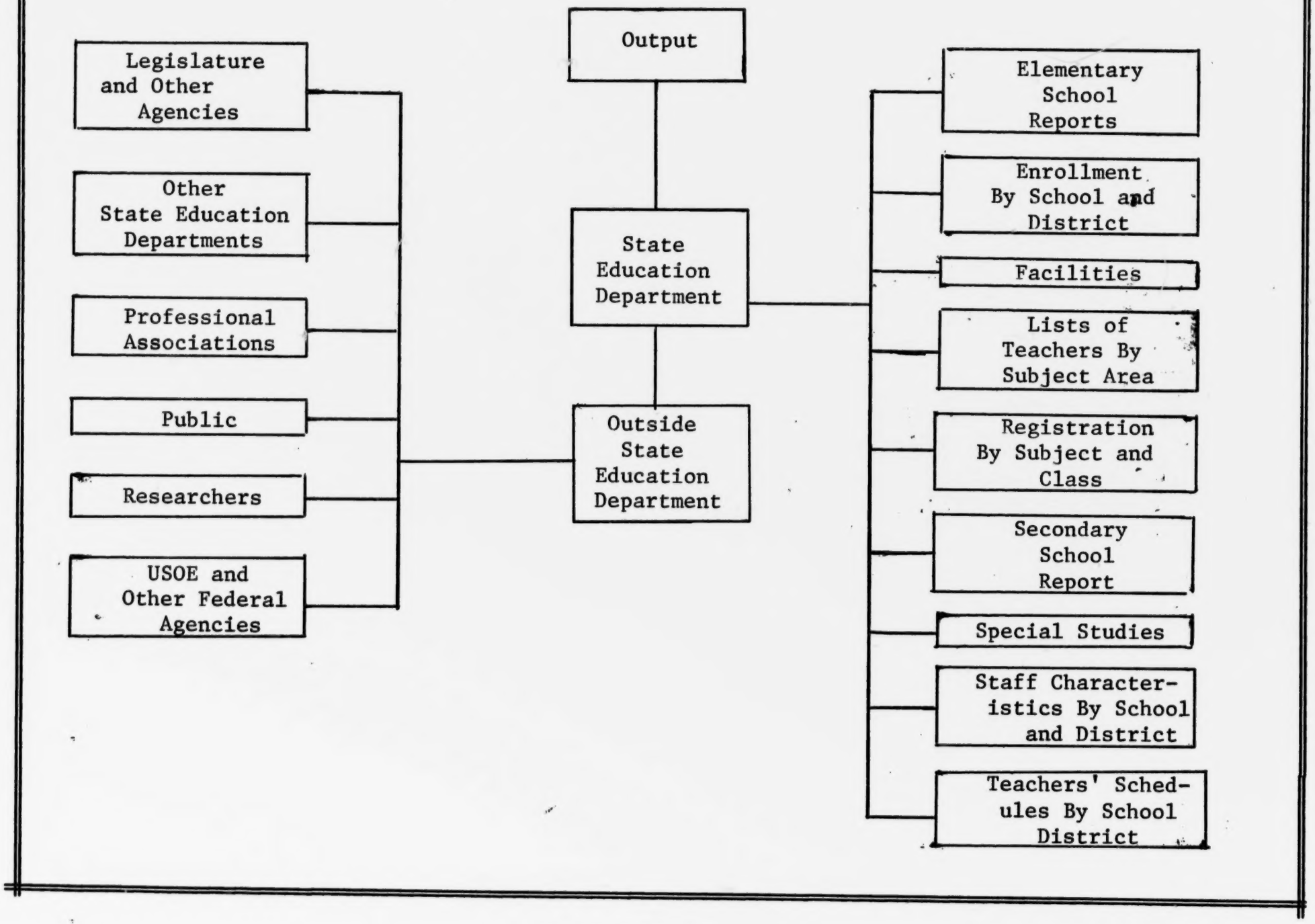


Output Flow

The various units of the State Education Department will undoubtedly be the principal users of information derived from the Basic Educational Data System. Some types of output for Department use are suggested at the right side of this chart (Figure 4).

Information will also be available to agencies external to the Department. The U. S. Office of Education will utilize selected items of information as part of the National Basic Educational Data System. Other users of System data, suggested by past experience, will be the Legislature; other State and federal Agencies; education departments in other states; researchers; professional associations; and, of course, the public.

Fig. 4.--Basic educational data system: output flow



Advantages

1) Data will be received by the department and converted into usable form early in the school year.

2) Use of mark-sense documents and optical scanning equipment will overcome a long-standing input problem related to keypunching.

3) Computer manipulation will enable the extraction of more information from source data than has been possible in the past. This will result in a more comprehensive educational picture of the State. For both internal and external use.

4) The system will relieve a large part of the clerical burden within various units of the department. The computer will perform data processing now done manually in those units.

5) The system will yield the maximum of information on a single contact with the supplier of the data, thus drastically reducing the number of separate requests for data.

6) By programming scientific sampling procedures into the computer, in-depth studies can be made when needed.

III. INTERAGENCY COORDINATION

While most studies indicate that the Educational Data System should be maintained in the State Department of Education, it is equally important that this System be a user of and a contributor to the total State level Data System.

Demographic and economic data compiled and maintained by other agencies should be available to the educational data system. Educational data should be readily available to all agencies that need these data. Primary agency users of elementary and secondary educational data would be expected to include:

State Budget and Control Board,
Governor's Planning and Grants Division,
Higher Education Commission,
Technical Education Committee,
Educational Television Commission,
Health Department, and
Department of Public Welfare.

The Department System is currently designed to provide financial data according to a standardized format compatible with other agencies. The program data will be developed in a format designed to facilitate merger with other State data. This approach should provide more flexible use of data and reduce duplication of data collection and storage.

Computer Services Planned and Provided for School Districts

Leadership

Five school districts in the State are actively developing data processing capabilities. Other districts are in the initial stages of planning similar operations either as their own projects or in cooperation with neighboring counties. The State Department of Education is faced with the responsibility of coordinating the systems in the State to develop procedures for data transfer to facilitate each district's operations. The proposed additions to the hardware existing in the State Department of Education are essential to this function.

Educational Program Planning

Much of the data generated by the local district is being processed by the Department's Management Information Office and returned to the school district in a format used in developing educational programs and projects designed to meet specific needs of pupils in that district. Also, these data are being compiled and used at the State level in planning State educational programs and projects.

Test Scoring

The Test Scoring Section of the Office of Management Information is scoring more than 600,000 test sheets this school year. Presently, this function depends on the availability of computer time from the University of South Carolina and the Department of Public Welfare.

Problems encountered in test scoring are due to the limited hardware available. The number of test sheets to be scored has increased significantly in the last two years and will continue to increase if this service is equipped with the hardware essential to the effective performance of this service.

Evaluation

A Statewide system of evaluation of educational programs at both the district and State levels is currently being revised and improved. The data generated in the data processing operation are vital to this operation.

Research

The Research Office of the Department of Education is involved in an extensive program of school surveys, which is basic to the development of the evaluation program. In addition, numerous studies are being completed which reveal the State's education status in an implicit and defensible format. This service is also operating beyond the limited capabilities of the existing equipment. During the current fiscal year, specific studies have been contracted with the University of South Carolina, Clemson University, and other agencies for the development of models designed to be used in succeeding years. The recommended hardware is essential to the effective use of the material being developed.

Projects of Future Service

Scheduling

Initial contacts have been made and feasibility studies are currently underway to determine the most efficient manner by which the Offices of Research and Management Information can assist the school districts in the State in developing classroom schedules for the individual schools.

Simulations

The development of simulation projects vital to efficient and effective planning procedures are currently under study for use by the State Agency and by the several school districts.

Computer Assisted Instruction

Programs through which the processes essential to computer-assisted instruction can be identified and developed are now in the initial stages of review. The projected plans for the involvement of the Offices of Research and Management Information are limited to initiating, developing, and implementing computer-assisted instructional programs in pilot situations. The current projects are being designed so that the programs would be operated by the several districts using hardware at the University and/or regional levels.

IV. HARDWARE CONFIGURATION

The data processing equipment currently operating in the State Department of Education is designed primarily to perform financial record-keeping functions and operations related to the financial system (Figure 5). The equipment has been expanded and modified to permit basic personnel records relating primarily to salary and state aid qualifications to be maintained. This service is being performed primarily for the Office of Finance, Office of Teacher Certification, Office of Elementary Education, and to a lesser degree for the Office of Secondary Education, the Office of Research, and the State Department generally.

The current punch-card oriented System 360 Model 20 Computer replaced the 407 accounting machine, which was in use in the State Department for many years. The system, while being a sophisticated punch-card system, is limited by the punch card for its auxiliary storage. In such a system, the retrieving of information and massaging of data becomes very cumbersome when large files of information are involved.

In the last few years, the information and data needs of the Department of Education have changed greatly; and the demands on the data processing service have not been met due, in part, to the limited capabilities of the system. The need for information in specific formats and for selected purposes is increasing both internally and externally for the State

Department of Education. To begin to meet this need, the data processing functions of the State Department of Education were reorganized and brought together to form the Office of Management Information in July, 1968. The needs of the expanding system designed to meet the data processing needs of the State Department of Education have been carefully studied over a period of time by selected personnel in the Offices of Management Information and Research in consultation with the other members of the State Department of Education. The hardware necessary for the effective operation of a system capable of meeting the current needs and possessing capabilities for expansion to meet future needs is described in the attached budget proposals.

Fig. 5.--Current system

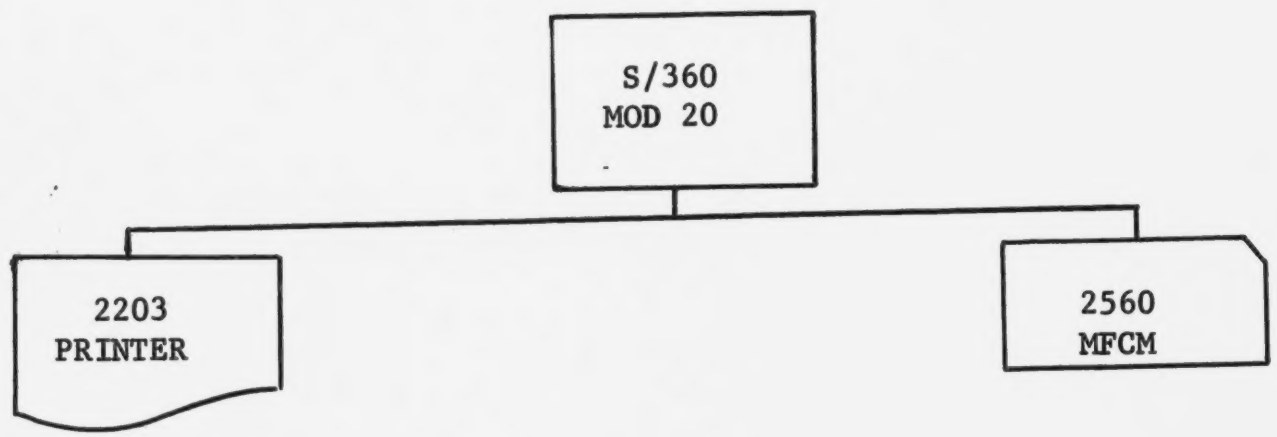


TABLE 1

INCREASED COST SCHEDULE

Hardware Description	Current Cost Monthly	Proposed Cost Monthly	Increased Monthly	Increase Annually
1-360/Mod 20 (Card System)	$2,316.47			
1-360/mod 30 (Tape and Disk)		$9,650.07	$7,333.60	$88,003.20
1-026 Printing Card Punch	61.80			
1-024 Card Punch	40.00			
2-056 Card Verifiers	100.00			
2-029 Printing Card Punches		166.86		
3-059 Card Verifiers		222.48	187.54	2,250.48
1-100DM Optical Scanner		824.00	824.00	9,888.00
TOTAL	$2,518.27	$10,863.41	$8,345.14	$100,141.68*

*Does not include sales tax.

The specific information in data processing needs to be met by the expanded system operated by the data processing system of the Office of Management Information will be divided into two major areas to be identified as financial information and basic educational information. In financial information, the functions currently performed related to accounting procedures, state aid information, and budget operations will be expanded and updated. The

TABLE 2

TOTAL RENTAL SCHEDULE

Hardware Description	Proposed Monthly	Proposed Annually
1-360/Mod 30 Tape & Disk System	$ 9,650.07	$115,800.84
2-029 Printing Card Punches	166.86	2,002.32
3-059 Card Verifiers	222.48	2,669.76
1-026 Printing Punch	97.85	1,174.20
1-083 Card Sorter	149.00	1,788.00
1-084 Card Sorter	272.95	3,275.40
1-085 Collator	125.00	1,500.00
1-824 Typewriter Card Punch	100.00	1,200.00
1-100 DM Optical Reader	824.00	9,888.00
Total	$11,608.21	$139,298.52
Total Proposed Rental		$139,298.52
Present Budget for Rental		39,000.00
Total Annual Budget Increase		$100,298.52

direct-access capacity of the system will allow an expanded coding system. This will allow detailed reporting of financial data with the flexibility to adjust to the varied formats prescribed by federal and State agencies. The system will provide current data for administrative use and for feedback to school districts. The system also will be designed to closely

correlate with the procedures being developed by the Budget and Control Board of the State government.

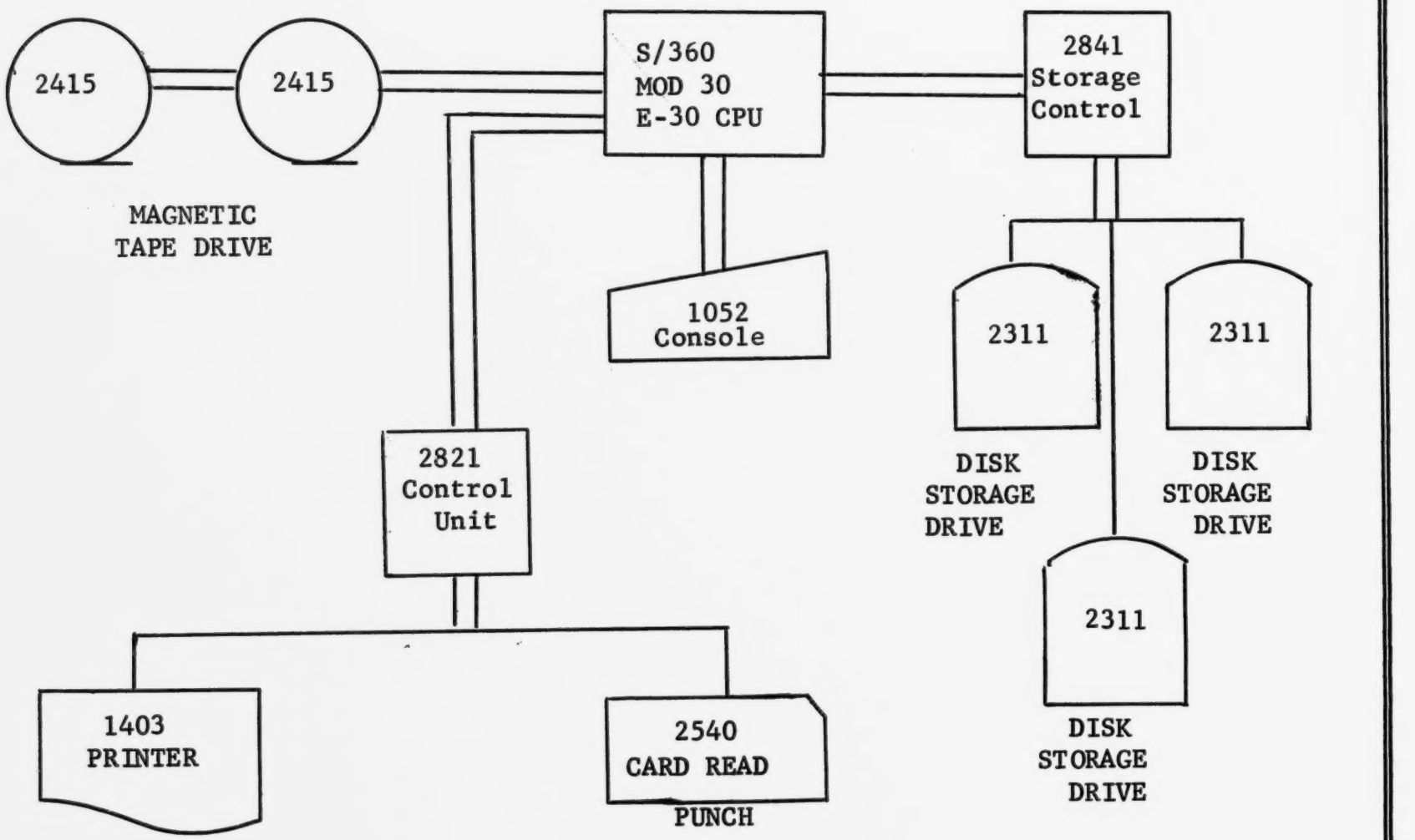
The second area of emphasis will be the development of a Basic Educational Data System. Through the expanded use of optical scanning equipment, data acquisition from school districts will be improved. Through machine operations, the percent of error will be reduced. Department personnel, at present, are determining the scope and items to be included in this bank of educational data. Once collected, the data items will be stored in such a way as to be retrieved for multiple applications. The projected uses of this system include the development of an educational profile of each school district which can be used for planning and evaluation by both the local district and the State Educational Agency. Another major need is the ability to provide decision makers with current and accurate data in the desired format. Users of this information would include the executive and legislative branches of government.

The State Board of Education has directed that the State Department of Education develop the capacity for long-range planning for education. Basic to fulfilling this mission is the development of a comprehensive educational data system.

Current planning within the Department and in coordination with other agencies is designed to insure the development of an information system that is comprehensive, flexible, and reponsive to present and future needs.

The requested configuration of data processing equipment is an essential phase in continued development of a system of management information.

Fig. 6.--Proposed system



APPENDIX: SUPPORTIVE DOCUMENTATION

A. Philosophy of State Board of Education
April 7, 1967

B. Review of South Carolina Department of Education
U. S. Office of Education
February, 1968

C. Management Information System Report
State Department of Education Staff
June 25, 1968

D. Analysis of Computer Needs
International Business Machines Corporation

EDUCATIONAL DATA SYSTEMS
IMPLICATIONS IN

South Carolina State Board of Education
Statement of Education Philosophy
Adopted April 7, 1967

3. Evaluation of Education

To carry out the statutory mandate, the Board believes that there should be an annual evaluation of educational quality in each school district in the State. The fundamental purpose of such an evaluation is to determine educational shortcomings, as the first step in developing improvements. The Board believes the major resources of the State Department of Education should be concerned with this evaluation process, and with the resulting aid to local school districts who most need improvement in achieving it. The basic yearly objectives and work plans of the Department should be structured upon the findings secured from the evaluation process.

5. Continuous Upgrading of Education

The Board as a fundamental tenet believes the State should have a continuous program for upgrading public education. Since the teacher is the primary resource in education, this means a continuous program for upgrading teaching ability and curriculum improvement.

The Board believes that the continuous upgrading of education requires careful planning, prudent use of the State's financial resources and continuous leadership in means of improvement. The Board, therefore, believes that there should be a five-year plan for educational improvement developed by the Superintendent and approved by the Board after open hearings on it. This five-year plan should be updated each year as a new year is added, and it should constitute the Board's primary means of communicating its programs and financial costs to the public and the Legislature.

6. Plans for Educational Improvement

Operating within the State master plan for long-range improvement, the Board believes each local school district should have at least a one-year plan for educational improvement. Such a plan should be a requisite for State aid and Federal project money, and should be developed after a careful evaluation of primary local needs for improvement.

11. Educational Experimentation and Research

The Board believes that a well developed system of educational experimentation and research is essential to full use of the State's resources toward educational improvement. Primary guidance and coordination should come from the Superintendent and the State Department of Education, but local school districts must initiate or participate in this research if it is to be successful.

The Board, as a matter of policy, believes that the State Department should provide the computer resource for research projects, with this resource available to local school districts. The Board also believes the Department should coordinate a statewide system of data processing on central equipment, so as to provide processing and statistical services to local school districts.

EXCERPTS FROM THE

UNITED STATES OFFICE OF EDUCATION

REVIEW OF THE SOUTH CAROLINA DEPARTMENT OF EDUCATION

February 1968

Representing the U. S. Office of Education

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R. L. Davis, Past President, South Carolina Association of School Boards

G. C. Frampton, County Superintendent, Charleston, South Carolina

H. L. Sneed, Superintendent, Florence District One, South Carolina

General Recommendations

1. In order to effectively plan for education it is first necessary to determine the status of education in the State. An effective program of evaluation should be initiated to assist the State Department in identifying educational problems and deficiences in the local school districts throughout the State. The State Department of Education should establish uniform procedures for a continuing program of assessment and evaluation.

   Such an evaluation program may include a sophisticated testing program specifically designed to provide information concerning individual pupil needs as well as providing overall information concerning assessment of local district, regional, and State educational problems.

2. Intensive study should be devoted to the identification of measures of educational needs which may be quantified and utilized to facilitate the planning process. For example, such measures could possibly include expenditures per pupil, reading level of pupils, occupation of parents, percentage of adults employed, personal income, etc.

The measures may be used to readily determine and define the desired educational goals of the State and local district.

3. In order to plan effectively, the State Department of Education should establish a series of short and long-range goals for the advancement of education in the State. The State Board has pointed out that within the five-year mast plan local school districts should establish plans of improvement for at least a one-year period.

The use of the evaluation and measurement techniques, as explained above, will assist the State in establishing goals and priorities within the overall five-year plan structure.

Specific Recommendations

1. A planning office should be established within the formal structure of the State Department of Education. At the present time there is no formal component of the Department adequately organized and staffed to handle this function. This office should employ a cadre of experts in planning and should in addition draw on the expertise of other governmental agencies, universities, and private enterprise. In addition, the planning

office, to be effective, must have access to departmental research and have unlimited access to data processing information. In order to achieve this a slight reorganization of existing office functions may be necessary or as an alternative a communication overlay may be established among the proposed Planning Office, the Research Office, and the Finance Office. Such an office should be directly responsible to State Superintendent of Education. Thought should be given to the formation within the Department of a Planning Council made up of the Superintendent, the Deputy Superintendents, Director of Planning, and others as the Superintendent may indicate.

Continuing study of the optimum structure of the Department is recommended. Rapidly changing educational programs and services require a flexibility of organizational structure which will not inhibit and hopefully will provide additional educational opportunities.

2. The role of the newly formed State Planning Commission (Governor's Planning Commission) should be more clearly defined as it relates to the State Department of Education. The State Planning Commission should assist the Department of Education in coordination of inter-agency planning at the State level and should provide the Department with information pertinent to statewide educational development.

MANAGEMENT INFORMATION SYSTEM STUDY REPORT

STAFF STUDY OF EDUCATIONAL DATA SYSTEMS
June 25, 1968

The committee commissioned to explore the procedures necessary for establishing a basic educational information system and to recommend initial steps that should be implemented in order to establish such a system submits the following information for consideration.

The State Department of Education already has several component parts of a basic educational information system in operation. The current needs appear to be to refine the existing system and to devise procedures which would result in increased utilization of data currently available. Data which is currently not available and which represents program areas frequently reported only partially should also be collected and stored in a compatible form designed to be assembled for a variety of flexible uses.

The demands for educational information are ever increasing. The public wants to know what is going on in our schools; the legislator and the administrator must make accurate and judicious decisions based on the past and the projected future; the researcher must have valid and reliable data in order to assess and update our educational programs. Present data are too often unrelated, unreliable and untimely due to duplication of effort, late reporting and slow data processing.

Handling educational data has become a massive problem. The Education Department presently utilizes many forms to solicit information of all kinds from elementary and secondary schools and from school districts. Analysis and interpretation of these data, both in the Department and in the schools, require their manipulation in many complex and time consuming ways either by hand or by involved machine processes.

Stated simply, an information system is an organized arrangement for making the right information available to those who need it, when they need it, in the desired format, all at the least possible cost. The key to a systems approach in dealing with information is organization; the procedures for collecting, processing, and disseminating information must be coordinated and routinized.

The basic operation of a management information system can be divided into two broad areas identified as general operations and financial operations. In financial operations, the primary functions performed relate to accounting procedures, State Aid information, and budget operations. The system devised for the financial operation of the State Department of Education must be closely correlated with the procedures being developed through the Budget and Control Board of the State Government. The detailed provisions for the operations of the management information system in the State Department of Education must be designed and operated in accordance with the procedures followed by the State Government. Therefore, the financial operations proposed for the management information system of the State Department of Education are not

reviewed in depth at this time because numerous agencies are already involved in the development and revision of these procedures.

The general operation of the management information system should be designed to provide detailed information in at least the five basic areas of staff, general school, transportation, school facilities, and textbook information. The basic information system currently operated in the State Department provides considerable detailed data concerning qualifications, training, and experience of the professional educational staff currently employed in the State. The professional staff is distributed among categories and classifications which must be more clearly defined and delineated.

In addition, the information currently available concerning personnel qualifications and assignments should be significantly expanded in order to make available more detailed information concerning the current status of the professional educational staff in South Carolina.

Some general school information primarily in the area of enrollment by school, by county, and by district is currently available. This data also needs to be refined, delineated, and expanded.

The areas of transportation, school facilities, and textbooks have only been explored and very little consistent data is currently available in these areas.

The management information system should be designed to provide useful information in the above identified areas as well as in those areas that shall be identified as the program evolves.

The basic steps needed for the establishment of an effective management information system have been identified as follows.

1) The first step must be an administrative and management commitment to the effective operation of such a system. In order to provide the necessary data, a system which operates effectively at all levels of educational enterprise must be established and maintained. The data must be provided in a systematic, consistent, usable manner. Therefore, authority and responsibility for developing the procedures, methods, and equipment must be delegated to those responsible for the operation.

The management information system must be operated as a service to the State Superintendent, to the State Board, to the State General Assembly, and to all Offices of the State Department of Education.

A State-wide educational data system will require that a central body within the State education agency be given responsibility and authority for coordinating all available information. Requests for information from both within and outside the department should be channeled through this committee or office. In turn, the requests should be evaluated in terms of: a) whether the information requested is already available (either internally or externally); b) the desirability of collecting the information, considering the overall objectives and responsibilities of the State education agency; and c) the feasibility of collecting the information, i.e., the relative value of having the information, compared with the time and

effort required of school and department personnel to get it. Such coordination would eliminate, at the point of origin, data collection which is unnecessary, undesirable, infeasible, or redundant.

While the systems approach to information handling demands routinization, the data collected need not and should not be routine. A substantial portion of the information in a State-wide system would necessarily be routine in the sense that it would be collected and processed periodically. However, the information--or at least some of it--would be changed from time to time to keep pace with changing needs. Indeed, a continuing department-wide evaluation of information needs should be an important part of the total information system.

One of the most salient characteristics of an information system is that it exists independently of the data that may be treated by it at any given moment in time. When effective data handling procedures are established, they can easily be adapted to new data. An information system that must be changed whenever data are added or deleted is not system at all.

Implementation of a State-wide educational data system will require the establishment of and information network leading from the working records maintained at the smallest operating unit of the educational enterprise to the largest organizational level and back again. It is of critical importance that this information network be founded on the proposition that with movement upward through the organizational levels, less and less detailed information is required.

The smallest operating unit in the network is a class--a teacher and a group of students in a classroom. The teacher needs a great deal of information about his students. He needs to know, for example, the students' names, ages, previous school records, standardized test scores, and special personal or learning difficulties, as well as what they did in class last month or last week and what they are going to do next week.

At the next level in the information network, the principal's office, there is generally more concern about how many pupils are taking a given course and how many are likely to take it next term than there is about individual, personal student data. Occasionally, of course, the principal does require detailed information about individual students, but not generally. In the day-to-day performance of his job, the principal needs summary information about what is going on in his school. At the school district level, the superintendent and board of education need, for the most part, summary information on all the schools that constitute the district in order to make policy and administrative decisions. In turn, a regional or State education agency needs trend data derived from summary information on all of the school districts in the region or in the State.

2) To facilitate the operation of the system, an executive committee or group representing the Offices of the State Department of Education who will use the information provided through the efficient operation of a management information system should be established and assigned the responsibility of cooperating in the development of procedures to be followed.

The group would cooperatively identify the basic information to be included in the management information system and would identify the data needed from the system and the format in which the information is to be made available. The group would serve as the policy and evaluation committee for the management information system.

3) A larger group composed of representatives from every Office in the State Department of Education should be organized to assure the involvement of the Offices in the operation of the total management information system. The larger group would be directly responsible for relating needs of the Office they represent to the management information system and of relating information and data available from the system to the Office staff with whom they work. The larger group would be fully informed of decisions made by the policy and evaluation committee group and would be expected to assist that group in procedural and design decisions.

4) The next step should be to design and implement forms necessary to secure the desirable data in all areas in which the management information system is to be operated. Initial consideration should be given to the refinement and delineation of data concerning the professional staff which is currently available. As these data are collected and organized into a workable format to meet the needs of the State Department of Education and other agencies, procedures which would relate to all areas would be identified. The second major area to be intensely developed would be that of general school information.

5) Early in the formation of the management information system, involvement of decision making personnel of the State Department of Education is absolutely essential. A basic understanding of the management information system concept by all decision making personnel is essential. The operation and utilization of the program can be delegated to subordinates; however, an understanding of the system which would result in a basic commitment to the system is absolutely essential if the system is to fulfull its potential and to warrant the expenditures necessary for hardware and personnel to effectively operate the program.

6) A basic function vital to the effective operation of the management information system concerns the definition of terms and procedures. A basic handbook defining terms and procedures should be developed initially and revised continually through the entire operation of the system.

7) When the program has been clearly defined and when the necessary forms and procedures for collecting the data have been developed, the management information system should be operated in the smallest, largest, and median size district of the State as a pilot program in order to perfect the system before involving all districts. Some of the information must originate in the local school and can be summarized at the district level, the county level, and the regional level to facilitate a more efficient operation of the total system. The data which can best be collected and disseminated at each of these levels must be identified.

8) When the program has been proven through the operation of the three pilot systems, the personnel of the management information system and of the school districts who have been

involved in the program should be used to thoroughly train other participants in the program at every level at which the system operates.

Specific first steps to be taken in the implementation of this program are as follows.

1) Inform the total professional staff of the State Department of Education that a management information system is currently being developed and the initial phase will become effective July 1, 1968.

2) Begin to staff the management information system and begin to develop the internal organization of the system. The staff of the management information system would be charged with the responsibility of developing information vital to the initial organization and operation of the system.

3) Appoint a committee consisting of not more than five (5) members who will be charged with the responsibility of cooperating with the management information staff in the development of operational procedures to be followed in the management information system, subject to the approval of the State Superintendent of Education.

4) Resource consultants and other specialist should be contracted to provide essential information and to assist in the development of the system. Consultant firms which are independent agencies not committed to any particular hardware manufacturer but knowledgeable of the type of system needed and which specialized in educational research and development could be advantageously used in such a relationship.

5) Management information system staff members and other representative members of the State Department of Education should be assigned to visit educational information systems currently in operation in order to collect data concerning the organization and operationsof the systems.

6) Consideration should be given to the identification of long-range goals for the program and of projecting the steps necessary to accomplish the identified purposes.

7) Programs should be planned and implemented for the specific purpose of informing executive level representatives of all operating units in the State Department of Education of the benefits and services that could be derived from an effective utilization of data available through the management information system.

8) Programs and/or workshops should be planned informing all supervisory personnel in the State Department of Education of the capabilities of the management information system.

9) Implement the management information system.

Respectfully submitted,

W. E. Ellis, Chairman

James P. Revels

Michael V. Woodall

I B M

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August 8, 1968

Mr. Jesse A. Coles, Jr.
Assistant Superintendent of Education
South Carolina State Department of Education
Rutledge Building
Columbia, South Carolina

Dear Mr. Coles:

Since our first meeting Jim Revels and myself along with Miss Kay Tolbert, the Systems Engineer assigned to your account, have been working closely studying the data processing needs of the State Department of Education. We have reviewed our findings with Mr. Ellis on several occasions and he has been in agreement with our recommendations. It is our purpose here to review those findings with you.

At present the State Department of Education is utilizing a punch card oriented System 360 Model 20 computer. This system replaced the 407 accounting machine which was in use in the State Department for many years.

The system, while being a very sophisticated punched card system, is limited by the punched card for its auxiliary storage. This makes information retrieval and managing of data very cumbersome when large files of information are involved. The system has to read the files a card at a time (at 600 cards per minute) to accumulate specific data from a file or to update information contained in a file. While reading information from punched cards at 600 cards per minute is fast compared to the 150 cards per minute of your 407, it is very slow when compared to the 156,000 characters per second reading rate of a disk drive or the 60,000 character reading rate of a magnetic tape drive.

The needs of the Department of Education have greatly changed in the past few years and the demands on the data processing department have not been met due to its somewhat limited capabilities. At present there seems to be a great need in the textbook division for help in maintaining its inventory records. The job has grown immensely and the present manual system is no longer adequate.

The area of teacher certification is also in great need of help. The jobs of file update and file inquiry are a tremendous burden and are almost impossible to handle manually. In this area the computer could be used to maintain the teacher records on a direct access device so that both updates to the files and inquiry into the files could be done by machine at machine speeds. Our ultimate goal in this area would be to provide the department with a cathode ray tube so that inquiry into the file could be made while sitting at the desk without moving thereby eliminating lost motion and time.

School accreditation is another area which needs mechanization. This area is one of extreme importance and until now has not received the help from the data processing department it so badly needs. If the proper job was done for it, the computer could help examine the school reports and make some statistical analysis from the responses. It could also compare the responses with those of previous reporting periods and with other schools of its particular type.

Your statewide test scoring and analysis application is another area which needs immediate attention. If you are to continue your program, it will be necessary to provide your own people the capabilities of accomplishing this job in your own shop. The reason for this is very simple. They cannot schedule machine time and have any assurance of getting this time when it is necessary. You are too dependent on an outside source and at times this is a cause of problems. This is a very important program for the local schools and they need the service desperately. It is said that many schools are still buying this service from an outside source. If you can improve the turnaround time of your service and expand the number of different tests you score, you can save these school districts a great deal of money which they could use on other projects.

There are many other areas that need to be examined and studied. It is our ultimate goal to form a State Education Information System which would completely involve every area of the Education Department. This, of course, cannot be completed in a month. It will require much more time than that. What we have discovered, however, are some areas that along with what is already being done should justify a computer with much more capabilities than you currently have. We feel that it is necessary to point out that as you move into a larger computer you will have the capabilities of doing practically any job. The consideration then will not be

whether or not you can do the job but whether the job should receive first or second priority. This priority, of course, will need to be decided not by data processing, but by a management information committee. The committee should be appointed by Mr. Busbee and should have representatives from each of the three assistant superintendents' offices, the director of management information, and data processing department.

It is our feeling that the State Department of Education should take interim steps toward implementing its information system. These steps should include both interim job objectives and interim hardware. By taking this approach we build the most flexible system possible plus having the economy of using the least possible hardware to accomplish each step.

We feel that in the first step you should convert your present programs to take advantage of direct access and add the jobs of the textbook division, teacher certification division, and the school accreditation division. This step should require approximately one year to complete with your current staff. If you hire additional people, both programers and systems people, it will take less time.

In the second step we will expand these jobs to an on-line system with terminals located throughout the department. This will give all of the power of the computer to its users and remove it from its air-conditioned, mystical environment.

The computer today is being used by educational institutions in many ways. The most useful and productive use seems to be directly in the educational process. Ultimately a step in implementing the Statewide Information System should be to provide terminals to the individual schools. This would allow the students the use of the computer in mathematics, science, business and computer assisted instruction. Many school districts throughout the country have begun to supply this type instruction aid to their teachers. A system of this type is very complex and pilot programs should be planned.

Along with supplying the students computer usage, you should also consider the school districts. In this area, there seems to be a tremendous need for help in administration without the necessary funds to supply it.

Even though it is difficult for the State Department to provide this aid to the schools, it should provide the leadership to the districts toward implementing such programs. At present the Federal Government is stressing the regional concept for computers in education.

Your approach to the regional concept should fit into their plans so that Federal funds might be available to support your project.

We feel that the aforementioned steps are essential in building your State Education Information System. We pledge our support to you in all of the phases toward building your system.

Attached you will find a schematic of the hardware requirements for your first and second steps.

If you have any further questions, please don't hesitate to let me know.

Sincerely,

W. B. Singleton
Marketing Representative